AMENDMENTS TO THE DRAWINGS

Figs. 7 and 8 have been amended to add the term, "PRIOR ART."

Mark-up Sheets further illustrating the above changes have been provided in addition to the Replacement Drawing Sheets for the Examiner's convenience.

REMARKS

Claims 1-20 are all the claims presently pending in this application. Claims 1-4 have been amended to more particularly define the claimed invention. Claims 5-20 have been added to claim additional features of the claimed invention.

It is noted that the amendments are made only to more particularly define the invention and **not** for distinguishing the invention over the prior art, for narrowing the scope of the claims, or for any reason related to a statutory requirement for patentability. It is further noted that, notwithstanding any claim amendments made herein, Applicant's intent is to encompass equivalents of all claim elements, even if amended herein or later during prosecution.

Figs. 7 and 8 have been amended to include the term "PRIOR ART."

Claims 1-4 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Hirata, U.S. Pat. App. Pub. No. 2001/0004373, further in view of Kondo, U.S. Pat. No. 6,597,728 further in view of Maltsev, U.S. Pat. App. Pub. No. 2004/0190438.

This rejection is respectfully traversed in view of the following discussion.

I. APPLICANT'S CLAIMED INVENTION

The claimed invention, as defined, for example, by independent claim 1, (and similarly independent claims 3 and 17) is directed to a frequency offset detection processing system including a TCXO (Temperature Compensated Crystal Oscillator, Temperature Compensated X'tal Oscillator) which generates a reference frequency, a demodulation unit which demodulates a reception signal, a frequency offset detection unit which detects a frequency offset from a phase moving amount between symbols of adjacent pilot signals, and

an AFC (Auto Frequency Control) control unit. The AFC control unit includes a majority determination unit which determines whether each of phase moving amount detection values by a plurality of frequency offsets, which are detected for a predetermined time and read out from the frequency offset detection unit, is a positive value or a negative value, and totalizes to determine which of the positive values and the negative values are larger in number, a detection value conversion unit which converts the phase moving amount detection values read out from the frequency offset detection unit in accordance with a majority determination result from the majority determination unit, an averaging processing unit which executes processing for adding the phase moving amount detection values read out from the frequency offset detection unit and converted by the detection value conversion unit and dividing a sum by the number of added values, a correction value calculation unit which calculates a frequency offset from the phase moving amounts after averaging processing by the averaging processing unit, and a TCXO control unit which corrects TCXO control on the basis of the frequency offset calculated by the correction value calculation unit.

Conventionally, to solve the above described problem and increase the accuracy for detecting the shift direction of a frequency offset in AFC control, a method of executing majority determination for the detection values of the shift direction of the frequency offset is used. In this method, to separately process the magnitude and direction of phase shift data, an automatic frequency control apparatus having a means for extracting only the magnitude information of a phase shift, a means for averaging only the magnitude information of the phase shift, a means for extracting only the direction information of the phase shift, and a means for making decision by majority for the direction information of the phase shift and selecting a direction of majority is used. The frequency of a local generation unit is

controlled in accordance with the average value and majority.

However, in the above-described method, the distribution of phase shift detection values after conversion by the majority determination result is distorted. Hence, the central value (actual phase shift) of the distribution and the average value (detection value after processing) of the distribution have different values. Hence, the phase shift detection error due to interference of thermal noise or the like cannot sufficiently be reduced. (Application at page 3, line 21 to page 4, line 27).

The claimed invention (e.g., as recited in claims 1, 3 and 17), on the other hand, includes *a majority determination unit which determines whether each of phase moving amount detection values by a plurality of frequency offsets, which are detected for a predetermined time and read out from said frequency offset detection unit, is a positive value or a negative value, and totalizes to determine which of the positive values and the negative values are larger in number*. This feature of the invention is important for determining the shift direction of a frequency offset by majority determination before averaging processing and making the signs of detection values coincide from the majority determination result. (Specification at page 8, lines 19-23.)

II. THE PRIOR ART REJECTIONS

A. The 35 U.S.C. § 103(a) Rejection over Hirata, U.S. Pat. App. Pub. No. 2001/0004373 further in view of Kondo, U.S. Pat. No. 6,597,728 further in view of Maltsev, U.S. Pat. App. Pub. No. 2004/0190438

The Examiner alleges that Hirata, U.S. Pat. App. Pub. No. 2001/0004373, (Hirata), further in view of Kondo, U.S. Pat. No. 6,597,728 further in view of Maltsev, U.S. Pat. App. Pub. No. 2004/0190438, (Kondo and Maltsev), makes obvious the invention of claims 1-4.

The Examiner alleges that one of ordinary skill in the art would have been motivated to modify Hirata with the teaching from Kondo and Maltsev to form the invention of claims 1-4. Applicant submits, however that these references would not have been combined and even if combined, the combination would not teach or suggest each element of the claimed invention.

Indeed, Applicant submits, however, that neither Hirata, Kondo and Maltsev, nor any alleged combination thereof, teaches or suggests, "*a majority determination unit which determines whether each of phase moving amount detection values by a plurality of frequency offsets, which are detected for a predetermined time and read out from said frequency offset detection unit, is a positive value or a negative value, and totalizes to determine which of the positive values and the negative values are larger in number*."

The Examiner admits that Hirata fails to teach or suggest:

"*a majority determination unit which determines whether each of phase moving amount detection values by a plurality of frequency offsets, which are detected for a predetermined time and read out from said frequency offset detection unit, is a positive value or a negative value, and totalizes to determine which of the positive values and the negative values are larger in number*," and

"*a detection value conversion unit which converts the phase moving amount detection values read out from said frequency offset detection unit in accordance with a majority determination result from said majority determination unit*."

However, the Examiner alleges that the phase corrector 208 of Maltsev is equivalent to Applicant's *majority determination unit*. Maltsev discloses at paragraph [0027]:

> [0027] Phase corrector 208 may adjust second phase shift estimate 231 by a multiple of 2.pi.. In one embodiment, the second phase shift estimate 231 may

> be adjusted, when a difference between first phase shift estimate 221 and second phase shift estimate 231 exceeds .pi., by adding +2.pi. if the sign of first phase shift estimate 221 is positive and -2.pi. if the sign of first phase shift estimate 221 is negative. Summator may convert first and second phase shift estimates 221 and 231 to first and second weighted frequency estimates prior to combining to generate frequency offset estimate 232. In one embodiment, summator 206 may multiply first phase shift estimate 221 by w2/4.pi.T to generate a first weighted frequency estimate, and may multiply second phase shift estimate 231 by w.sub.2/4.pi.T to generate a second weighted frequency estimate. Weights w.sub.1 and w.sub.2 may be provided by weights 210 and T may be the duration of a training symbol. (Emphasis added.)

However, Maltsev fails to teach or suggest the phase corrector 208 *determines whether each of phase moving amount detection values by a plurality of frequency offsets, ... is a positive value or a negative value, and totalizes to determine which of the positive values and the negative values are larger in number*.

Maltsev merely discloses the phase shift estimate 231 may be adjusted when a difference between a first and second phase shift estimate exceeds π (180°) by adding $+2\pi$ (+360°) if the sign of the first estimate is positive, and by adding -2π (-360°) if the sign of the first estimate is negative. Maltsev fails to teach or suggest taking the first and second phase shift estimates and "*totalizes to determine which of the positive values and the negative values are larger in number*."

This feature of Applicant's invention is important for determining the shift direction of a frequency offset by majority determination before averaging processing and making the signs of detection values coincide from the majority determination result. (Specification at page 8, lines 19-23.) The phase corrector 208 of Maltsev fails to serve the same function as Applicant's *majority determination unit* to *determines whether each of phase moving amount detection values by a plurality of frequency offsets, ... is a positive value or a negative value, and totalizes to determine which of the positive values and the negative values are larger in*

number.

Therefore, Maltsev fails to overcome the deficiencies of Hirata.

Therefore, Applicant respectfully requests the Examiner to reconsider and withdraw this rejection since the alleged prior art references to Hirata and Kondo and Maltsev (either alone or in combination) fail to teach or suggest each element and feature of Applicant's claimed invention.

B. Newly Added Independent Claims 17-20 with Respect to the Applied Prior Art References

With respect to Applicant's newly added independent claims 17, the applied prior art references and any combination thereof fail to teach or suggest, "*a majority determination unit which determines whether each of phase moving amount detection values by a plurality of frequency offsets, which are detected for a predetermined time and read out from said frequency offset detection unit, is a positive value or a negative value, and totalizes to determine which of the positive values and the negative values are larger in number*."

Therefore, none of the cited prior art references nor any alleged combination thereof teaches or suggests these features of Applicant's claimed invention with respect to newly added claims 17-20.

III. FORMAL MATTERS AND CONCLUSION

In view of the foregoing, Applicant submits that claims 1-20, all of the claims presently pending in the application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Respectfully Submitted,

Date: Sept 28, 2007

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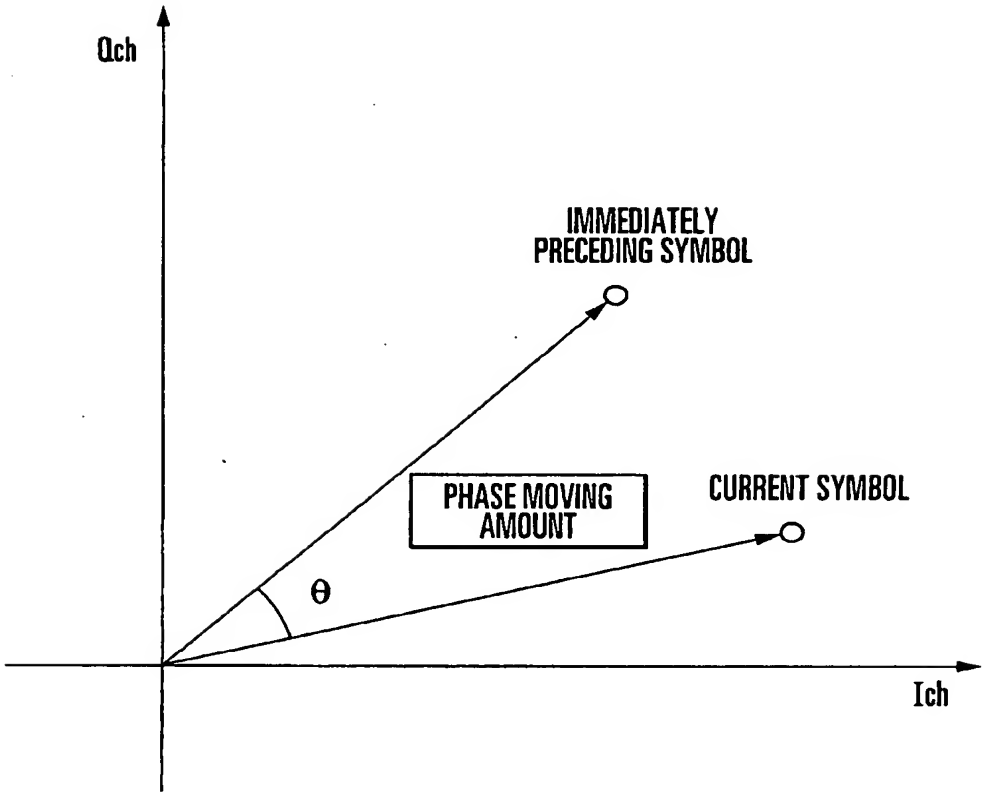

FIG. 7
PRIOR ART

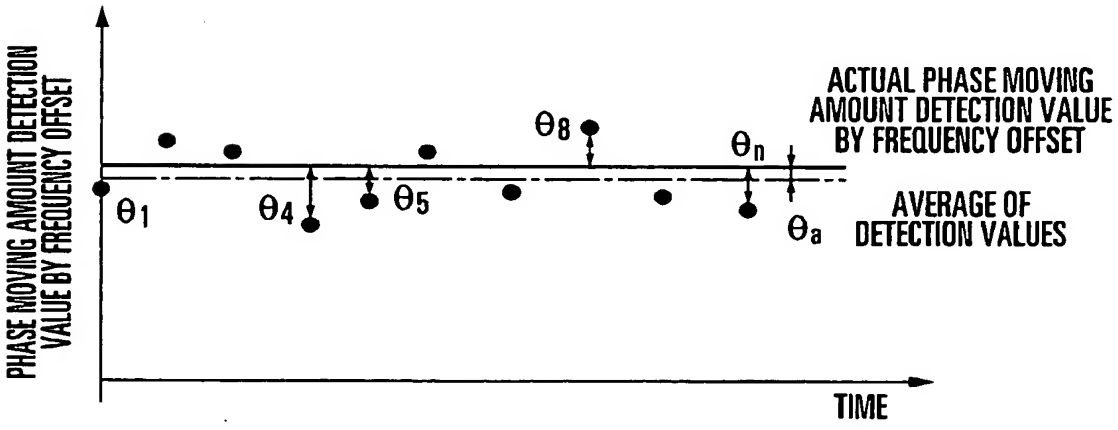

FIG. 8
PRIOR ART